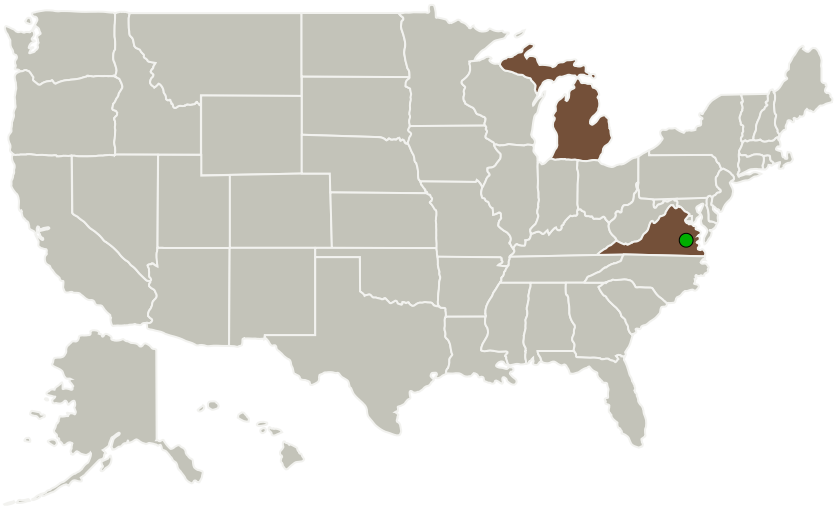
Piezoelectric MEMS Microphones for Ground Testing of Aeronautical Systems, Phase II

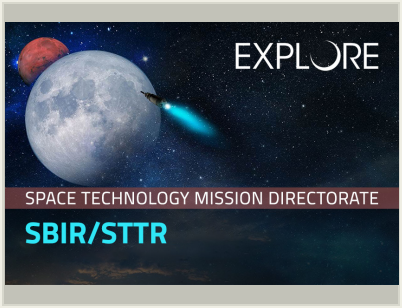
Completed Technology Project (2011 - 2013)

Project Introduction

Improving the acoustical environment is critical in aeronautics. Airports and aeronautical systems manufacturers are facing ever-increasing demands to reduce noise levels. Aeronautical applications require the use of high quality microphones with a large dynamic range, sometimes in large arrays. These arrays are expensive. The advent of lower cost microphones that meet the users' specifications would dramatically improve the ability of engineers seeking to quantify the acoustic impact of either their designs or their facilities (e.g., airports) and to make data driven decisions to improve any adverse situation. In our Phase-I SBIR, we showed the technical feasibility of a commercially viable, piezoelectric micro-electro-mechanical systems (MEMS) microphones capable of withstanding adverse conditions found in ground testing of the acoustics of aeronautical systems. In the Phase II project, we will implement design changes to improve these sensors. We will develop efficient deep reactive ion etching (DRIE) procedures to increase our yield and lower costs. We will develop scalable packaging techniques so that the devices can be economically assembled into a completed device. Finally, the reliability and robustness of these microphones will be determined. Each of these tasks will advance us toward our goal of producing a commercially viable product with outstanding acoustical performance.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Baker-Calling, Inc.	Lead Organization	Industry	Ann Arbor, Michigan
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Michigan	Virginia

Project Transitions

June 2011: Project Start

December 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139219)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Baker-Calling, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

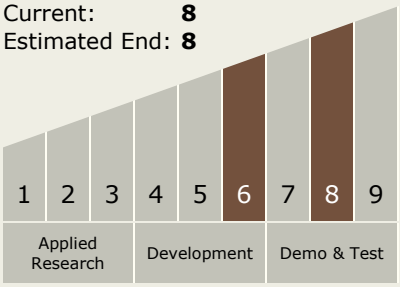
Carlos Torrez

Principal Investigator:

Robert Littrell

Technology Maturity (TRL)

Start: **6**
Current: **8**
Estimated End: **8**



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Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.1 Infrastructure Optimization
    - TX13.1.1 Natural and Induced Environment Characterization and Mitigation

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System